

Neuro-transmitter	Biosynthesis (Precursor/Enzyme)	Transporter	Receptor	Major signaling pathway	Regional localization
Dopamine	1. phenylalanine/phenylalanine-hydroxylase 2. tyrosine/tyrosine hydroxylase 3. L-DOPA/aromatic amino acid decarboxylase ^[277]	DAT ^[278]	D1-like family (D _{1,5}) D2-like family (D _{2,3,4})	↑cAMP ↓cAMP	C, STR (CN), SN, AMYG, HC ^[101; 279; 280] STR (GP), NAcc, OLB ^[101; 279; 280]
Serotonin	1. L-tryptophan/tryptophan hydroxylase 2. 5-hydroxy-L-tryptophan/decarboxylase ^[281]	5-HTT ^[136]	5-HT _{1A} (D _{α, Dβ, E, F}) 5-HT _{2A} (B,C) 5-HT ₃ 5-HT ₄ 5-HT _{5A} 5-HT ₆ 5-HT ₇	↓cAMP IP3 ion channel ↑cAMP ↓cAMP ↑cAMP ↑cAMP	C, RN, S, AMYG, HC, HTH ^[282] C, HC, AMYG, NAcc, STR, HTH ^[283] AMYG, C, HC, NAcc, SN, VTA, BS ^[284] BG, HC, STR, NAcc, C ^[285; 286] C, HC, CER, HTH, STR, S ^[287] STR, HC, C ^[285] HC, CN, GP, THAL, DRN, SN, SCN, C ^[285; 288]
GABA	glutamate/ glutamine acid decarboxylase ^[64]	GAT ₁ , GAT ₃ ^[289]	GABA _A GABA _B	ion channel ↓cAMP	C, HC, BG, THAL, CER, BS ^[290] C, HC, BG, THAL, CER, BS ^[290]
Glutamate	glucose-derived tricarboxylic acid cycle intermediates ^[291]	EAAT ₁₋₅ ^[292; 293] , VGLUT ₁₋₃ ^[294]	NMDA AMPA Kainate Group I mGlu _{1,5} Group II mGlu _{2,3} Group III mGlu _{4,6,7,8}	ion channel ion channel ion channel IP3 ↓cAMP ↓cAMP	Ubiquitous, C, predom. forebrain, HC ^[295] HC, C ^[296] HC, C, CER ^[296] Widespread, HC, C ^[295; 297; 298] Widespread, HC, C ^[295; 298] Widespread, HC, C, CER ^[295; 298]

Abbreviation: + = excitatory; - = inhibitory; GABA = Gamma-aminobutyric acid; L-DOPA = L-3,4-dihydroxyphenylalanine; DAT = dopamine active transporter; 5-HTT = 5-hydroxytryptamine transporter; GAT = Gamma-aminobutyric acid (GABA) transporter; EAAT = excitatory amino-acid transporter; VGLUT = vesicular glutamate transporter; NMDA = N-methyl-D-aspartate; AMPA = α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid; mGlu = metabotropic glutamate receptor; IP3 = inositol-1,4,5-trisphosphate; cAMP = cyclic adenosine monophosphate; STR = striatum; CN = caudate nucleus; GP = globus pallidus; NAcc = nucleus accumbens; OLB = olfactory bulb; RN = raphe nucleus (D = dorsal); S = septum; AMYG = amygdala; HC = hippocampus; HTH = hypothalamus; C = cortex; VTA = ventral tegmental area; BS = brain stem; SN = substantia nigra; SCN = suprachiasmatic nucleus; THAL = thalamus; BG = basal ganglia